

## CLAIMS:

1. A method of fabricating a tunable dielectric slurry, comprising:  
depositing a thick film tunable dielectric onto a substrate;  
subjecting said thick film to Ultra Violet (UV) radiation exposure after it  
5 is coated onto said substrate;  
drying and baking said thick film and said substrate;  
applying a developer to said thick film and said substrate, said developer  
capable of washing away an unexposed area of said thick film and retaining an exposed  
area enabling a latent pattern to be brought out and thus creating a patterned film; and  
10 sintering said substrate.

2. The method of claim 1, wherein said thick film is screen printed onto said  
substrate.

3. The method of claim 2, wherein said thick film is thixotropic.

4. The method of claim 1, wherein said thick film is spin coated onto said  
substrate.

5. The method of claim 4, wherein said thick film is Newtonian.

6. The method of claim 1, wherein said step of depositing a thick film onto a  
substrate is accomplished by a technique selected from a group consisting of:

transfer coating;

tape casting; and

dip coating.

7. The method of claim 1, wherein said step of subjecting said thick film to  
UV radiation exposure after it is coated onto said substrate includes using a photo mask in the  
exposure process to define exposure patterns intended for the film to receive.

8. The method of claim 1, wherein components in said fabricating a tunable dielectric slurry, are selected from the group consisting of:

ceramic powder;  
photosensitive polymer;  
5 photoinitiator;  
solvents;  
photo inhibitor; and  
adhesion promoter.

10 9. The method of claim 1, wherein said tunable dielectric is Parascan® Tunable dielectric.

10. A method of manufacturing a photodefinable tunable dielectric, comprising:

15 preparing a slurry to be photopatterned, said slurry containing a tunable dielectric powder and said preparation comprising hand mixing and mill mixing said slurry to reach homogenization;

photopatterning said slurry, said photopatterning comprising:

20 stirring and mixing said slurry;  
spin coating said slurry to form a pre-fired film;  
soft baking said film;  
exposing and developing said film;  
rinsing and drying said developed film; and  
firing said film.

25 11. The method of claim 10, wherein said stirring said slurry is hand stirred and said mixing is ultrasonic.

12. The method of claim 10, further comprising measuring the viscosity of said slurry.

13. The method of claim 10, wherein said soft baking is from 90°C to 120°C for 2-4 minutes.

14. The method of claim 10, wherein exposure time for exposing said film is sensitive to said film thickness and varies from 2-10 seconds for film thickness from 2-10um.

15. The method of claim 10, wherein said firing is at a peak temperature of 1100°C and film shrinkage is 40% - 50%.

16. The method of claim 10, wherein said slurry is 40wt% of Parascan® dielectric powder and 60wt% of BPRS300.

17. The method of claim 10, further comprising providing a photodefinable vehicle positive photosensitive polymer system.

18. A vertical varactor, comprising:  
a substrate;  
at least two electrodes placed on said substrate to form a gap between said electrodes; and  
a tunable dielectric thick film in said gap between said at least two electrodes.

19. The vertical varactor of claim 18, wherein said vertical varactor is made from a photo patternable thick film process.

20. The vertical varactor of claim 19, wherein said photo patternable thick film process comprises:

depositing a thick film tunable dielectric onto a substrate;

subjecting said thick film to UV radiation exposure after it is coated onto  
5 said substrate;

drying and baking said thick film and said substrate;

applying a developer to said thick film and said substrate, said developer capable of washing away an unexposed area of said thick film and retaining an exposed area enabling a latent pattern to be brought out and thus creating a patterned film; and

10 sintering said thick film and substrate.

21. The vertical varactor of claim 19, wherein said photopatternable thick film process comprises:

preparing a slurry to be photopatterned, said slurry containing a tunable dielectric  
15 powder and said preparation comprising hand mixing and mill mixing said slurry to reach homogenization; and

photopatterning said slurry, said photopatterning comprising:

stirring and mixing said slurry;

spin coating said slurry to form a pre-fired film;

20 soft baking said film;

exposing and developing said film;

rinsing and drying said developed film; and

firing said film.

25 22. A coplanar varactor, comprising:

a substrate;

a tunable dielectric thick film on said substrate; and

at least two electrodes placed on said substrate so as to form a gap between said  
electrodes.

23. The coplanar varactor of claim 22, wherein said coplanar varactor is made from a photo patternable thick film process.

24. The coplanar varactor of claim 23, wherein said photo patternable thick  
5 film process comprises:

depositing a thick film tunable dielectric onto a substrate;

subjecting said thick film to UV radiation exposure after it is coated onto  
said substrate;

drying and baking said thick film and said substrate;

10 applying a developer to said thick film and said substrate, said developer  
capable of washing away an unexposed area of said thick film and retaining an exposed  
area enabling a latent pattern to be brought out and thus creating a patterned film; and  
sintering said thick film and substrate.

15 25. The coplanar varactor of claim 23, wherein said photopatternable thick  
film process comprises:

preparing a slurry to be photopatterned, said slurry containing a tunable dielectric  
powder and said preparation comprising hand mixing and mill mixing said slurry to reach  
homogenization; and

20 photopatterning said slurry, said photopatterning comprising:

stirring and mixing said slurry;

spin coating said slurry to form a pre-fired film;

soft baking said film;

exposing and developing said film;

25 rinsing and drying said developed film; and

firing said film.